Conclusion: The traditional use of reference segment dimensions to direct balloon size produces an inconsistent acute gain. Balloon selection based on pre-intervention lesion vessel area assesment with ICUS achieves a more predictable gain in lumen dimensions with Palmaz-Schatz stents.

994-43 Arterial Remodeling After Directional Coronary Atherectomy: A *Volumetric* Analysis from the Serial Ultrasound Restenosis (SURE) Trial

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To better understand the process of arterial remodeling following directional coronary atherectomy, we performed blinded, independent *volumetric* (vol) intravascular ultrasound (IVUS) analysis using an automated contour detection algorithm applied to 20 mm long arterial segments centered on the minimum lumen areas. Arterial and lumen vol (mm^3) in 18 lesions were used to calculate plaque (arterial-lumen) vol pre- and post-intervention and at 24 hrs, 1 mo, and 6 mo.

	Pre	Post	24 hrs	1 mo	6 mo	p*
Arterial vol	335 ± 108	377 ± 107	394 ± 110	401 ± 103	352 ± 125	< 0.0001
Lumen vol	107 ± 44	179 ± 47	187 ± 52	201 ± 47	159 ± 69	0.0001
Plaque vol	227 ± 93	198 ± 87	205 ± 78	198 ± 75	193 ± 76	0.2281

*p ANOVA for repeated measures: post vs 24 h vs 1 mo vs 6 mo

Importantly, (1) Δ lumen vol correlated with Δ arterial vol ($r = 0.903$, $p < 0.0001$), but not with Δ plaque vol ($r = 0.246$, $p = 0.0733$) at each interval during the follow-up period, (2) there was no significant increase in plaque vol at any time, and (3) the axial *location* of the minimum lumen area varied significantly over the length of the lesion.

We conclude: Blinded, independent volumetric IVUS analysis confirms that late lumen loss following directional coronary atherectomy is the result of late pathologic arterial remodeling (decrease in arterial vol), not neointimal hyperplasia (increase in plaque vol). Late pathologic remodeling is preceded by early adaptive remodeling (increase in arterial vol).

994-44 Results of High Pressure Ultrasound-Guided "Over-sized" Balloon PTCA to Achieve "Stent-like" Results

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To test the strategy of "aggressive" PTCA and provisional stent implantation, we performed intravascular ultrasound (IVUS)-guided primary PTCA coupled with high inflation pressures to treat 242 native vessel lesions. *Methods:* Pre-intervention IVUS imaging was used to assess proximal and distal reference arterial and lumen dimensions and to calculate a reference segment mid-wall ("media-to-media") dimension. The IVUS "media-to-media" dimension was used to select PTCA balloon sizes which were inflated to "high" (> 10 atm) pressures. Pts were crossed-over to stent implantation if this strategy (1) failed to achieve achieve a final lumen area > 70% of the reference lumen areas or (2) resulted in IVUS lumen compromising dissections. *Results:* 148 lesions (61%) treated with primary PTCA "crossed-over" to stent implantation. In the remaining 94 lesions balloon sizes measured 3.5 ± 0.6 mm (an angiographic balloon-to-artery ratio of 1.16), and inflation pressures measured 13.5 ± 3.3 atm. Post-PTCA, the final lumen area measured 6.0 ± 2.0 mm^2; this represented 75 ± 18% of the average reference lumen area (or an IVUS diameter stenosis of 14 ± 11%). Furthermore, the residual cross-sectional narrowing (plaque/arterial area) measured 56 ± 11%. IVUS dissections were present in 20%, and there were no abrupt closure episodes. *Conclusion:* Applying a technique of high-pressure oversized (IVUS-guided) balloon PTCA, "stent-like" lumen dimensions can be achieved in 40% of pts. Late clinical follow-up will determine whether this aggressive PTCA strategy yields similar repeat revascularization rates compared to provisional or elective stent placement.

994-45 IVUS Findings in Angiographically Optimized Stents in Native Vessels and Vein Grafts: Lessons from the AVID Study

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AVID (Angiography versus Intravascular Ultrasound Directed Coronary Stent Placement) is a multicenter randomized study designed to assess the impact of intravascular ultrasound (IVUS) guidance on stent deployment in the "high-pressure era". The aim of this study was to characterize the differences seen by intravascular ultrasound between native vessels (NV) and saphenous vein grafts (SVG) following angiographic stent optimization (< 10% residual stenosis) by high pressure dilatation. An analysis of 253 stented vessels, 196 native vessels (86 LAD, 26 LCx and 84 RCA) and 57 SVG (stents/vessel = 1.47 and 1.5 for native vessels and SVG, p = NS), was performed in 230 consecutive patients. The following parameters were analyzed: maximal inflation pressure (atm), mean reference lumen diameter (ref L diam, mm), stent/artery ratio (S/A = stent size/ref L diam), % of calcific reference segments (% Ca), % of complete apposition (% app), % expansion (% exp = minimal stent area/mean reference lumen area). *Results:* The maximal inflation pressure used was 17.3 atm in SVG and 17.4 atm in native vessels (p = NS). 80% expansion was achieved in 52.6% of stents in SVG and 29.0% in native vessels ($p < 0.001$). The significant discrepancies between the two groups are shown in the table below:

	ref L Diam	S/A	% Ca	% app	% exp
NV	3.39 ± 0.58*	1.03*	65.8*	85.8*	73.2 ± 17.3*
SVG	3.86 ± 0.62	0.95	22.8	35.1	78.8 ± 18.5

*$p < 0.05$ NV vs SVG

In SVG's the % app was independently related to the stent/artery ratio ($p < 0.001$). In NV's, % exp showed an inverse relationship with the % of calcific reference segments ($p < 0.01$) and the mean ref L diam ($p < 0.05$).

Conclusion: The higher rate of incomplete apposition in SVG was related to an underestimation of the stent/artery ratio in larger vessels. The higher incidence of suboptimal stent expansion in native vessels was associated with the higher % of calcific reference segments. The impact of these morphologic observations will be assessed at 12 months.

994-46 The Impact of Target Lesion Calcium Distribution on the Magnitude and Pattern of Palmaz-Schatz Stent Expansion

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To evaluate the impact of calcium distribution on expansion of Palmaz-Schatz stents, we used intravascular ultrasound to study 112 heavily calcified lesions (arc of calcification ≥180°). Lesions were matched for reference lumen size. Pre- and post-intervention measurements included minimum lumen area, minimal lumen diameter (MLD), acute lumen area and MLD gain, and stent eccentricity (maximum/minimum stent diameters). Lesions were divided into two morphologic groups depending on their circumferential distribution of calcification: (1) *concentric* calcification = single arc of calcium ≥300° or multiple arcs distributed uniformly around the vessel circumference or (2) *eccentric* calcification = eccentric calcium with either a normal vessel wall or non-echogenic plaque opposite the calcium.

	Concentric (N = 58)	Eccentric (N = 54)	p
Final lumen area (mm^2)	7.21 ± 2.07	7.09 ± 1.63	0.7472
Acute lumen area gain (mm^2)	4.21 ± 2.26	3.60 ± 1.94	0.1282
Final MLD (mm)	2.64 ± 0.42	2.47 ± 0.33	0.0262
Acute diameter gain (mm)	1.01 ± 0.52	0.77 ± 0.42	0.0095
Stent eccentricity index	1.26 ± 0.19	1.41 ± 0.17	< 0.0001

We conclude: In heavily calcified lesions, the distribution of target lesion calcium effects both the pattern and the magnitude of stent expansion. Eccentric calcification leads to non-uniform stent expansion (increased eccentricity index).

994-47 Improved Acute Outcomes During Ultrasound (ICUS)-Guided Intervention Achieved Without Increased Device Utilization or Procedure Time: Findings From the Strategy of ICUS-Guided PTCA and Stenting (SIPS) Trial

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ICUS has been shown to provide useful information during coronary interventions, however is perceived to add extra time and expense to the procedure. The SIPS trial randomized 269 patients (355 lesions) to either primary treatment with a combined ICUS/variable diameter balloon (Oracle Focus, Endosonics) or standard therapy using conventional balloons and angiographic guidance. The ICUS-guided group had 66% fewer acute phase adverse events and had a significantly lower post procedure residual % diam-